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Steiner Trees over Generalized Checkerboards

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STEINER TREES OVER GENERALIZED CHECKERBOARDS

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Given n randomly placed points in the plane, how can these points be connected by a network of minimum total length? Using graph theory, the answer lies in the formation of a minimum spanning tree. If additional points can be added to the tree, then the minimum spanning tree can often be shortened even further, resulting in what is known as a Steiner minimal tree. Unfortunately, no simple, general algorithm exists for finding Steiner minimal trees.

In examining a specific class of graphs, Chung, Gardner and Graham investigated building Steiner trees over "checkerboards" built of unit squares ("Steiner Trees on a Checkerboard", Mathematics Magazine, V. 62, # 2, 1989). In generalizing their ideas to rhombuses, we have discovered that for certain checkerboards with "small enough" angle, the length of their corresponding networks can be shortened by considering the checkerboards as built from isosceles triangles rather than from rhombuses.